

**APPENDIX 6.7-A**

**Financial Assurance Estimate**

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**Dewey-Burdock Project Financial Assurance - Appendix 6.7-A  
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Summary of Costs by Year  
Dewey-Burdock Project  
Powertech (USA), Inc.

<b>Dewey-Burdock - Restoration and Reclamation Costs - Deep Well Disposal Option</b>								
Project Year		1	2	3	4	5	6	Total
Operation Phase		Construction	Production	Restoration + Stability		Decommissioning		
Production (lbs U3O8)		-	1,000,000	2,588	-	-	-	
No.	Description							
1	Facility Decommissioning							
A	Salvageable Equipment					121,000	121,000	242,000
B	Non-salvageable bldg. & equipment disposal					355,040	355,040	710,080
C	11e.(2) byproduct material disposal			4,400		231,105	231,105	466,609
D	Restore contaminated areas						570,300	570,300
2	O&M - Aquifer restoration and stability monitoring							-
A	Method: RO treatment with permeate injection			448,937	448,937			897,873
B	Method: groundwater sweep with Madison injection							
3	Well field reclamation							-
A	Well plugging & closure					375,650	375,650	751,300
B	Remove surface equipment & reclaim					487,525	487,525	975,050
4	Radiological Survey						10,300	10,300
5	Project Management Costs & Miscellaneous			268,400	242,300	229,500	228,500	968,700
6	Labor incl. 35% overhead + 10% contractor profit			534,000	398,000	270,000	135,000	1,337,000
7	Contingency @ 15%			188,360	163,385	310,473	377,163	1,039,382
	Total Financial Assurance Amount	-	-	1,444,097	1,252,622	2,380,293	2,891,583	7,968,594

Summary of Costs by Year  
Dewey-Burdock Project  
Powertech (USA), Inc.

<b>Dewey-Burdock - Restoration and Reclamation Costs - Land Application Option</b>								
Project Year		1	2	3	4	5	6	Total
Operation Phase		Construction	Production	Restoration+ stability		Decommissioning		
Production (lbs U3O8)		-	1,000,000	2,588	-	-	-	
No.	Description							
1	Facility Decommissioning							
A	Salvageable Equipment					121,000	121,000	242,000
B	Non-salvageable bldg. & equipment disposal					561,790	561,790	1,123,580
C	11e.(2) Byproduct material disposal			4,400		261,716	261,716	527,831
D	Restore contaminated areas						1,429,100	1,429,100
2	O&M - Aquifer restoration and stability monitoring							
A	Method: RO treatment with permeate injection							
B	Method: groundwater sweep with Madison injection			277,850	277,850			555,700
3	Well field reclamation							-
A	Well plugging & closure					375,650	375,650	751,300
B	Remove surface equipment & reclaim					487,525	487,525	975,050
4	Radiological Survey						24,400	24,400
5	Project Management Costs & Miscellaneous			268,400	242,300	229,500	228,500	968,700
6	Labor incl. 35% overhead + 10% contractor profit			534,000	398,000	270,000	135,000	1,337,000
7	Contingency @ 15%			162,698	137,723	346,077	543,702	1,190,199
	Total Financial Assurance Amount	-	-	1,247,348	1,055,873	2,653,258	4,168,383	9,124,861

<b>Notation</b>	
<b>Abbrev.</b>	<b>Definition</b>
ac	acres
ac-ft	acre-feet
BSW	baseline sampling well
CF	cubic feet
CPP	Central Processing Plant
CY	cubic yards
d	days
DDW	deep disposal well
est.	estimated
ft	feet
ft <sup>3</sup>	cubic feet
gpm	US gallons/minute
HH	header house
IMW	internal monitor wells
IW	injection wells
IX	ion exchange
kgal	thousand gallons
kW	kiloWatt
kWh	kiloWatt-hour
L	liter
LA	land application
lb	pounds mass
lf	linear foot
M#	million pounds
MET	meteorological
mg	milligrams
Mgal	million gallons
MW	monitor wells
MWh	megaWatt-hour
PMW	perimeter monitor wells
ppm	parts per million
PV	pore volumes
PW	production wells
RC	restoration composite
R/T	round trips
SF	Satellite Facility
TDH	total dynamic head
U3O8	uranium oxide product
WF	well field
y	year

Assumptions  
Dewey-Burdock Project

<b>Table 1: Assumptions</b>			
Dewey-Burdock Project			
Powertech USA, Inc.			
Description	Quantity	Units	
<b>Production phase parameters</b>			
1	Production objective	1,000,000	lb/y U3O8
2	Ore zone mass per unit area (Total resource/total ore body area)	1.59	lb/sq ft
3	ISR recovery efficiency	0.75	
4	Ore body area in active ISR (1MMlb/y U3O8/0.75/(1.59 lb/ft <sup>2</sup> ))	836,050	sq. ft
5	Ratio of actual pattern area/ ore body area	1.04	
6	Active ISR wellfield area	869,493	sq ft
7	Active ISR wellfield area	20.0	acres
8	Area per 70' x 70' pattern, mean	4,450	sq ft/pattern
9	Design flow rate of production composite	4000	gpm
10	Design flow rate of production composite per production well	20	gpm
11	Mean grade of extracted water (ppm U3O8) (design)	60	mg/L U3O8
12	Number of online patterns to meet production goal (active area/(area/pattern))	195	patterns
13	Ratio of injection wells to production wells (design)	2.1	IJ/PW
14	Number of online injection wells required to meet objective	411	IW
15	Number of online production wells per header house (design)	18	PW/HH
16	Number of HH required to meet production objective (PW/18)	11	HH
17	Number of perimeter monitor wells in Burdock WF#1 and Dewey WF#1	70	PMW
19	Number of overlying internal mon. wels in active production zone @ 1 per 4 ac.	5	MW
20	Number of underlying internal monitor wells in active prod. zone @ 1 per 8 ac.	2	MW
21	Total number of active internal monitor wells in Burd. WF#1 and Dew. WF#1	7	Int. MWs;
22	Number of internal monitor wells per HH	1	Int. MW/HH
24	Baseline sampling wells in active production area (1 per 4 acres )	5	BSW
26	Length of large (10' wide) pipeline trench	10,000	ft
28	Length of medium (5' wide) pipeline trench	5,050	ft
30	Length of small (2' wide) pipeline trench	2,000	ft
<b>Summary of active wells for production phase</b>			
1	Production wells	195	PW
2	Injection wells	411	IW
3	Perimeter ring wells	70	PMW
4	Internal monitor wells	7	IMW
5	Baseline sampling wells	5	BSW
6	Header houses	11	HH
7	Total # monitor wells per 1MM lb/y produced during production	77	MW
8	WF access roads	17,000	ft

Assumptions  
Dewey-Burdock Project

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<b>Assumptions - continued</b>			
<b>Description</b>	<b>Quantity</b>	<b>Units</b>	
<b>Well field equipment in place at end of 1st year production</b>			
1	Total wells to be plugged & abandoned	683	wells
2	Wellhead covers to be heated during aquifer restoration (PW + IW + MW)	683	wells
3	Header houses	11	HH
4	Overhead electric lines	101,000	ft
5	Facility access roads (24') (Burd. - 7,975 ft., Dew. - 8,550 ft.)	16,525	ft
6	Well field access roads (12') (Burd. - 11076 ft., Dew. - 11,710 ft.)	22,786	ft
<b>General aquifer restoraton assumptions</b>			
1	Restoration flow rate	500	gpm
2	Restoration operating days	365	day/y
3	Ore zone porosity	0.30	
4	Ore zone thickness	4.6	ft
5	Flare factor, volumetric	1.44	
6	Pore volumes required for restoration	6.0	PV
<b>Restoration parameters</b>			
1	Pore volume affected in year 1 = (ore body area/1M pounds U3O8 recovered) x thickness x porosity x flare factor	12,924,359	gallons/M# recovered
2	Total volume restoration composite, including excess wellfield area, for 6 PV	77,546,156	gallons
3	Months to restore a pattern (6 PV @ 20 gpm)	0.5	month
4	Years to restore aquifer for 1M lbs of U3O8 recovered (total vol RC/500 gpm)	0.30	years
<b>Well plugging parameters</b>			
1	Mean well depth (Inj., Prod., Monitoring) (Burd.-450', Dew.-600')	525	ft
2	Inside diameter	4.91	inch
3	Volume per foot (for plugging)	0.131	ft <sup>3</sup> /ft
4	Volume to be plugged per well	69	ft <sup>3</sup>
<b>Pipeline disposal</b>			
1	HDPE pipe density, SG	0.95	
2	Void volume in chipped pipe	10%	
<b>Pond solids</b>			
1	Addition rate of barium chloride to restoration composite	20	mg/L
2	Percent solids	40%	
3	Specific gravity	1.4	
4	Pond sludge density	87.2	lb/CF

Assumptions  
Dewey-Burdock Project

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<b>Assumptions - continued</b>				
<b>Description</b>		<b>Units</b>	<b>Disposal Option</b>	
<b>Flow rates during restoration period (gpm)</b>			<b>DDW</b>	<b>LA</b>
	1 Madison water (gpm)	gpm	150	500
	2 Well field wastewater to disposal system (gpm)	gpm	150	500
<b>Pond inventories at beginning of financial assurance period</b>				
	1 CPP pond capacity	ac-ft	15.9	36.2
	2 CPP pond - 50% capacity	Mgal	3	6
	3 Storage ponds - 50% capacity of 8 ponds @ 63.8 ac-ft	Mgal		83
	4 Surge ponds - 50% capacity of 2 ponds @ 8.4 ac-ft	Mgal	3	
	5 Radium settling & outlet ponds 100% capacity	Mgal	14	29
	6 Total inventory at beginning of financial assurance period	Mgal	20	118
<b>Wastewater disposal</b>				
	1 Volume of restoration wastewater (Mgal)	Mgal	23	78
	2 Total wastewater (Mgal)	Mgal	43	196
	3 Volume to DDW (Mgal)	Mgal	43	
	4 Volume to land application (Mgal)	Mgal		196
<b>Madison water required</b>				
	1 Volume of Madison water required	Mgal	23	78
<b>Stability Period</b>				
	1 Length of stability period		12	
	2 Number of sampling events		5	
<b>Pump/motor parameters</b>				
	1 Pump efficiency - variable frequency drive		0.90	

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Unit Costs  
Dewey-Burdock Project

**Unit Costs**

*Cost factors presented here and elsewhere in this Appendix are from vendor quotes, from the 2009 RS Means cost estimating handbooks, from recent ISR license applications, and from calculations as described.*

<b>1 Energy costs</b>	<b>Unit</b>	<b>Price</b>
Electrical power	\$/kWh	0.07
Propane	\$/gal	2.15
<b>2 Chemical Costs</b>	<b>unit</b>	<b>\$/unit</b>
Hydrogen peroxide - 50% solution	lb	0.30
Sulfuric acid - 93%	lb	0.135
Sodium hydroxide - 50% solution	lb	0.145
Sodium chloride	lb	0.09
Sodium carbonate	lb	0.135
Barium chloride dihydrate	lb	0.67
<b>3 Well plugging costs</b>		
Cost of plugging mix.	\$/CF	9.00
Cost of plugging cement per well	\$/well	621.29
Contract labor w/ equipment, 4 crew-hr/well @ \$125/hr	\$/well	500.00
Total plugging cost per well	\$/well	1121.29
<b>4 11e.(2) byproduct material disposal cost</b>		
Transportation to White Mesa, UT (785 miles 1-way) @ \$3.55/loaded mile + \$1.85/unloaded mile for 30 CY load	\$/CY	140
11e.(2) disposal fee, soil-like material	\$/CY	150
11e.(2) disposal fee, equipment	\$/CY	150
<b>5 Pipeline removal cost</b>		
Excavation & pipe removal - from Table 14		
Pipelines ≥ 8"	\$(ft-pipe)	0.533
Pipelines ≥ 3"-6" @ 50% rate of large pipe	\$(ft-pipe)	0.267
well field pipelines 1"-2" @ 25% rate of large pipe	\$(ft-pipe)	0.133
<b>Pond disposal</b>		
Liner removal and shredding	\$(ft <sup>2</sup> -liner)	0.05
Pipe chipping	\$/CF	0.15

Operation and Maintenance during Aquifer Restoration  
Dewey-Burdock Project

O&M During aquifer restoration phase Dewey-Burdock Project		Subtotals			
		DDW	LA	DDW	LA
O&M					
1	Well field operations, prorated for length of restoration (years = 0.30 )				
	General well maintenance	54,000	54,000		
	Well MIT- none in first 5 years	0	0		
	Replacement of submersible pumps	12,000	12,000		
	Header house maintenance	9,000	9,000		
	Pipelines & road maintenance	9,000	9,000		
	Subtotal well field operation			84,000	84,000
2	Capital equipment				
	RO units, RO sump pumps, roll-offs (direct & indirect)	593,000	70,000		
	Subtotal capital equipment			593,000	70,000
3	Pumping costs				
	RO pumps	19,900			
	Madison aquifer booster	1,700	5,700		
	Plant to radium settling ponds	7,100	32,200		
	From outlet pond to disposal (LA or DDW)	7,100	71,500		
	Subtotal pumping costs			35,800	109,400
4	Facility operation				
	Resin replacement	0	0		
	Resin transport	300	300		
	Electricity	17,000	17,000		
	Propane	59,000	59,000		
	Maintenance	12,000	12,000		
	Subtotal facility operation			88,300	88,300
5	Chemicals				
	For resin elution	2,300	2,300		
	For Radium precipitation	2,610	8,700		
	Subtotal chemicals			4,910	11,000
6	Groundwater, Surface water monitoring				
	Subtotal groundwater and surface water monitoring	62,000	62,000	62,000	62,000

Operation and Maintenance during Aquifer Restoration  
Dewey-Burdock Project

O&M During aquifer restoration phase Dewey-Burdock Project		Subtotals			
		DDW	LA	DDW	LA
7 Disposal well					
Electricity		20,000			
Maintenance		9,863			
	Subtotal disposal well			29,863	-
8 Land application system					
Electricity			96,000		
Maintenance			35,000		
	Subtotal land application system			-	131,000
Total O&M for aquifer restoration	Totals	897,873	555,700	897,873	555,700
		DDW	LA	DDW	LA

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Operation and Maintenance Costs  
Dewey-Burdock Project

<b>Table 3: Operating and maintenance costs</b>						
<b>Dewey-Burdock Project</b>						
<b>Powertech (USA), Inc.</b>						
		<b>Number</b>	<b>Quantity</b>	<b>Units</b>	<b>Rate</b>	<b>Cost (\$/yr)</b>
<b>Annual well field costs during aquifer restoration assuming continuous 365-day/y operation</b>						
<b>Wells (per well)</b>						
	General well maintenance	1	1	lump sum	300	300
	Well Mechanical Integrity Testing (every 5 yr)	1	0			0
	Electric utilities:					
	Well head heaters (0.5 kW, 8 hr/day, 180 days/yr)	1	720	kWh	0.070	50
<b>Header houses (per HH)</b>						
	Flow meter maintenance (2 @ \$50 ea.) per HH	2	1	ea	50	100
	Replacement pressure gauges/switches	20	1	ea	50	1,000
	Equip. maintenance (@ 2% of new equipment capital)	1	80,000	%	0.02	1,600
	<b>Subtotal maintenance</b>					<b>2,700</b>
	Electric utilities:					
	Bldg. heating (5 kw, 180 days/yr)	1	22,000	kWh	0.070	1,500
	Instrumentation (1 kw)	1	9,000	kWh	0.070	600
	<b>Subtotal power</b>					<b>2,100</b>
<b>Wellfield maintenance</b>						
	# Production (extraction) wells		195	prod wells		
	# Injection wells		411	inj wells		
	General well maintenance (\$300/well * (PW+IW)/y)					182,000
	Well MIT - none in first 5 years		-			
	Replacement of submersible pumps (10%/yr @ \$2,000 each)		39,000	\$		
	# Header houses (per MM # produced)		11.0	HH		
	Header house maintenance (# HH x \$2700/HH)			per HH	2,700	29,700
<b>General well field maintenance</b>						
	Pipelines		1	lump sum	20,000	20,000
	Road maintenance materials (gravel/culverts)		1	lump sum	10,000	10,000
	Wireless telemetry and security systems maintenance		1	lump sum	2,000	2,000
	<b>Subtotal maintenance</b>					<b>32,000</b>

Operation and Maintenance Costs  
Dewey-Burdock Project

		Number	Quantity	Units	Rate	Cost (\$/yr)
<b>Annual Facility/Plant costs</b>						
	Ion exchange resin replacement - DOWEX 21K XLT		0	CF	221	0
<b>Utilities:</b>						
<b>Electricity</b>						
	PC booster pump 250 gpm @ 90' TDH	2	83,000	kWh	0.070	5,800
	IC booster pump 250 gpm @ 90' TDH	2	83,000	kWh	0.070	5,800
	Resin transfer pump 100 gpm @ 50' TDH	1	9,180	kWh	0.070	643
	Utility water pump (300 gpm @ 40' TDH )	1	22,020	kWh	0.070	1,500
	RO unit - included in deep well disposal option below					
	CPP HVAC	1	175	MWh	0.070	12,300
	CPP lighting (0.8 W/ft <sup>2</sup> for 10 <sup>4</sup> ft <sup>2</sup> )	10,000	70,000	kWh	0.070	4,900
	CPP instrumentation (2 kw)	1	18,000	kWh	0.070	1,300
	Maintenance bldg. HVAC	1	87.6	MWh	0.070	6,100
	Office bldg. HVAC	1	87.6	MWh	0.070	6,100
	Satellite facility HVAC	1	88	MWh	0.070	6,100
	Satellite facility instrumentation	1	18,000	kWh	0.070	1,300
	Exterior lighting	1	88	MWh	0.070	6,100
	<b>Subtotal annual electric power</b>					<b>57,943</b>
<b>Propane @ 21,600 Btu/gal (gallons from ER)</b>						
	CPP/SF space heating	1	77,220	gal/y	2.150	166,000
	CPP thermal fluid heater, prorated for restoration production of U3O8	2.59E-03	14,145	gal/y	2.150	100
	Maintenance bldg	1	11,598	gal/y	2.150	24,900
	Office bldg	1	4,883	gal/y	2.150	10,500
	<b>Subtotal annual propane</b>					<b>201,500</b>
	Resin transport to CPP		6	R/T per yr	50	<b>300</b>
<b>Land Application Option Operating Cost</b>						
	Land app. pumps from pond to pivots (200' TDH) (water vol. from Table 1)	196	5.220	kWh/kgal	1,021,000	0.07
						71,470
	<b>Days of irrigation</b>	<b>Days</b>				
	March 29-May 10	42				
	May 11-Sept 24	136				
	Sept 25-Oct 31	37				
	<b>Total available irrigation days per year</b>	<b>215</b>				

Operation and Maintenance Costs  
Dewey-Burdock Project

	Number	Quantity	Units	Rate	Cost (\$/yr)	
<b>Pivot Irrigation system capacity</b>					<b>subtotal</b>	
	<b># installed</b>	<b># used</b>	<b>@ gpm</b>	<b>gpm</b>		
50 acre Pivot - 15 hp drive	5	5	104	520		
25 acre Pivot - 10 hp drive	0	0	52	0		
15 are Pivot - 7.5 hp	0	0	31	0		
Total land application rate (gpm)				520		
Total days of irrigation required (wastewater volume/total LA rate)				261		
Irrigation Years @ 215 days/y				1.2		
<b>Cost of pivot irrigation operation</b>				<b>\$/kWh</b>	<b>Cost \$</b>	
Center pivot hydraulic pump; 15 hp for 50 ac areas (use 13 RHP)	5	350,471	kWh	0.07	24,500	
Center pivot hydraulic pump; 10 hp for 25 ac areas (use 8 RHP)	0	0	kWh	0.07	0	
Center pivot hydraulic pump; 7.5 hp for 15 ac areas	0	0	kWh		0	
Sump pump at 25 ac land app site (return irrigation tailwater/runoff)	0	3,000	kWh	0.07	0	
Sump pump at 50 ac land app site (return irrigation tailwater/runoff)	5	10,000	kWh	0.07	3,500	
<b>Subtotal land application power</b>					<b>99,000</b>	
<b>Equipment maintenance</b>				<b>\$</b>	<b>Annual Cost</b>	
Center pivot machines	5	1	year	500	2,500	
Equip. maintenance (@ 3% of new equipment capital) - pumps only		78,000	%	3	2,300	
Equipment replacement (@ 3% of new equipment capital)		1,464,000	%	3	43,900	
<b>Subtotal annual maintenance</b>					<b>49,000</b>	
<b>Prorated pivot maintenance (129/365)</b>					<b>35,038</b>	
<b>Total cost land application</b>					<b>205,508</b>	
<b>Deep disposal well operating cost</b>						
Injection pump maintenance and repair (assume 6%/y of cap cost)	2	150,000	Cap cost	0.06	18,000	
		Wastewater volume (Mgal)	43			
		Days of DDW operaton (ww volume/(150 gpm total flow rate))	200			
		Prorated DDW maintenance			9,863	
<b>Electric utilities:</b>						
Deep disposal well PD pump (4, but only one operating)						
150 gpm @ 1000' TDH)	1	275,300	kwh	0.070	19,300	
Bldg. heating (1 kw, 180 days/yr)	1	4,000	kwh	0.070	300	
RO unit power	1	284	MWh	0.070	19,900	
<b>Subtotal annual DDW power</b>					<b>20,000</b>	
<b>Prorated DDW power (216/365)</b>					<b>10,959</b>	
<b>Total deep well cost (power + maint.)</b>					<b>20,822</b>	

Operation and Maintenance Costs  
Dewey-Burdock Project

		Number	Quantity	Units	Rate	Cost (\$/yr)
<b>Restoration</b>						
	<b>Treatment chemicals</b>					
	IX cost (from Operating Chemicals)			LS	1.000	11,000
	<b>Subtotal</b>					<b>11,000</b>
	<b>Treatment maintenance</b>					
	Process hardware maintenance + replacement @ 4% of Capital		994,000	cap cost	0.040	39,760
	<b>Subtotal</b>					<b>40,000</b>
	<b>Madison water supply power</b>					
	Maintenance @ 10%/y of replacement cost of (\$75K/pump)	2	75,000		0.100	15,000
	Madison booster pump (150 gpm; 500 TDH; 24 hr/day)	1	184,000	kwh	0.070	13,000
	<b>Subtotal</b>					<b>28,000</b>
	Power costs that vary with disposal option					
	<b>Madison water supply booster pump (free flowing) @ 40' TDH</b>	Mgal	kWh/kgal	\$/kWh	Cost \$	
	DDW option	23	1.040	0.07	1,700	
	LA option	78	1.040	0.07	5,700	
	<b>Pump power from ponds to disposal</b>	Mgal	kWh/kgal		Cost \$	
	DDW option Booster Pumps (90 TDH)	43	2.350	0.070	7,100	
	LA option Booster Pumps (200 TDH)	196	5.220	0.070	71,500	
	<b>Booster pumps from plant to radium settling ponds</b>	Mgal	kWh/kgal		Cost \$	
	DDW option booster pumps (90 TDH)	43	2.350	0.070	7,100	
	LA option booster pumps (90 TDH)	196	2.350	0.070	32,200	

Capital Equipment  
Dewey-Burdock Project

<b>Table 4: Capital Equipment</b>									
<b>Disposal well option</b>									
									Estimated
									Capital
Description	Equipment List Number	No./Size	Quantity	Units	Unit Cost	Purchase Cost	Shipping Cost	Capital Cost	
Capital equipment to be purchased									
					0	0	0	0	
					0	0	0	0	
Shredder (HDPE/poly/PVC/FRP)		1	1	each	50,000	50,000	2,500	53,000	
BFI 30 CY roll-off containers		2	1	each	7,800	16,000	800	17,000	
RO sump pump	300-P-011, spare	0	1	each	1,915	0	0	0	
RO skid (Incl pretreatment, filtration and feed pump) 100 gpm	100-RO-001	2	1	each	248,841	498,000	24,900	523,000	
<b>Estimated Restoration Equipment - Subtotal:</b>									<b>593,000</b>
<b>Land application option</b>									
									Estimated
									Capital
Description	Equipment List Number	No./Size	Quantity	Units	Unit Cost	Purchase Cost	Shipping Cost	Capital Cost	
Restoration system									
					0	0	0	0	
					0	0	0	0	
Shredder (HDPE/poly/PVC/FRP)		1	1	each	50,000	50,000	2,500	53,000	
BFI 30 CY roll-off containers		2	1	each	7,800	16,000	800	17,000	
RO sump pump	300-P-011, spare	0	1	each	1,915	0	0	0	
RO skid (Incl pretreatment, filtration and feed pump) 100 gpm	100-RO-001	0	1	each	248,841	0	0	0	
<b>Estimated Restoration Equipment - Subtotal:</b>									<b>70,000</b>

Chemicals  
Dewey-Burdock Project

<b>Table 5: Chemicals</b>						
<b>Dewey-Burdock Project</b>						
Chemical usage			<b>usage rate</b>			
Hydrogen peroxide - 50% solution			0.36	lb/(lb U3O8)		
Sulfuric acid - 93%			1.00	lb/(lb U3O8)		
Sodium hydroxide - 50% solution			0.92	lb/(lb U3O8)		
Sodium chloride			4.60	lb/(lb U3O8)		
Sodium carbonate			0.92	lb/(lb U3O8)		
Barium chloride dihydrate			20	mg/(L-RC)		
Flow rate			500	gpm		
Uranium concentration			5	ppm		
Uranium concentration in IX tails			1	ppm		
Volume of restoration composite extracted			77,550,000	gal		
U3O8 production during restoration activities			2588	lb U3O8		
<b>Chemical Costs (\$/y)</b>						
Project year	1	2	3	4	5	6
U3O8 production from restoration activities (lb U3O8)			2588	0	0	0
<b>Cost of Chemicals</b>						
Hydrogen peroxide - 50% solution			300			
Sulfuric acid - 93%			300			
Sodium hydroxide - 50% solution			300			
Sodium chloride			1100			
Sodium carbonate			300			
Barium chloride dihydrate			8,700			
<b>Subtotal</b>			<b>11,000</b>	-	-	-



## Monitoring Dewey-Burdock Project

Table 7: Monitoring								
Dewey-Burdock Project								
Ennironmental Monitoring		Number	Quantity	Units	Rate (\$)	Cost (\$/yr)		
<b>Met Station</b>	Met station for site	1	12	visits/yr	200	2400		
<b>Water Qual.</b>								
	20 metals, mercury, alk, Cl, SO4, NO3, Fl, EC, pH, and TDS (Test America) @ \$350 (w/ shipping)							
	spec, Th, U, and gross A/B (Test America) @ \$550 (w/ shipping)							
	<b>End-of-ISR sampling</b> Sampling from set of 6 baseline wells in production zone for all analytes of TR Table 6.1-1. Assume analytical cost of \$1,000/sample. Sample prior to beginning of restoration activity.	1	6	wells/ sampling event	1000	6,000 \$/sampling event		
	<b>Restoration:</b> Monitoring during restoration for optimization, efficiency and to identify spatial discrepancies. Sample composite restoration stream at completion of of each pore volume extracted at each site, analyze for Table 6.1-1 analytes.	2	6	wells/ sampling event	1000	12,000 \$ total		
	<b>Excursion monitoring:</b> Sampling every 60 days of all monitor wells for excursion indicator parameters + water level. Analytes tested in CPP lab @ ~ \$10/sample.	1	77	wells/ sampling event	10	770 \$/sampling event		
	<b>Stability:</b> Same as End-of-ISR sampling at beginning of stability period and after each quarter for 12-month stability period	5	6	wells/ sampling event	1000	30,000 \$/stability period		
<b>Radon</b>	CPP (10 dose buttons quarterly)	4	10	buttons/qtr	50	2,000 \$/year		
	Satell/Well Field (5 dose buttons/quarter)	4	5	buttons/qtr	50	1,000 \$/year		
	Restor/Decom (5 buttons quarterly)	4	5	buttons/qtr	50	1,000 \$/year		
	Project Year		1	2	3	4	5	6
	<b>Restoration/Stability</b>		Construction	production	restoration + stability mon.	Decomm.	Decomm.	
	End-of-ISR				6,000			
	Met station				2,400	720		
	Restoration				12,000			
	Stability				20,000	10,000		
	Excursion monitoring				4,620	1,500		
	Radon				2,600.0	2,000		
	<b>Annual Subtotals</b>				<b>48,000</b>	<b>14,000</b>	<b>-</b>	<b>-</b>
	<b>Total Monitoring</b>	<b>62,000</b>						

Well Field Reclamation  
Dewey-Burdock Project

<b>Table 8: Well Field Reclamation Dewey-Burdock Project</b>							
<b>Well Decommissioning</b>						<b>Value</b>	<b>Units</b>
Unit cost per well (assume avg. depth of 650 feet)							
5" diameter casing =						0.131	CF/LF
Average well depth =						525	LF
Volume per well =						69.0	CF
Cement grout cost =						9.00	\$/CF
Cement plug cost/well						621.29	\$/well
Equipment + labor: pull tube, pump; cut & remove casing below grade.							
Contract labor/equipment (incl. mob/demob) = 4 crew-hr/well @ \$125/hr						500	\$/well
Total abandonment cost/well (rounded) =						1,100	\$/well
Cost of plugging wells # wells (from Table 1) = 683						751,300	\$LS
<b>Total well plugging &amp; abandonment costs</b>						<b>751,000</b>	<b>\$LS</b>
<b>Surface Structures</b>							
		<u>No./Size</u>	<u>Quantity</u>	<u>Units</u>	<u>Cost</u>	<u>Demo Cost</u>	<u>Waste vol (Cu. Ft)</u>
<b>Overhead Power</b>							SubtitleD 11e.(2)
Power poles: one every 200' (40' H, 5' in ground); pull + cut in half, place pole and cross arms in roll-off	47+54K' OHE	505	505	each	297	150,000	27,888
Power cables	Assumed zero net cost (removal cost = salvage value)					0	
<b>Wells</b>		<b>CF per well</b>	<b># wells</b>	<b>Quantity</b>			
Casing/wellhead appurtenances/cover from prod/inj/mon. wells @ 64 CF/well	64	683	683				43,712
Well pumps from PW+MW	1	272	272				272
Down-hole tubing wells (2" X 625' x 0.36" wall)	14	683	683				9,579
<b>Total WF Surface structures</b>							<b>71,600 9,851</b>

Well Field Reclamation  
Dewey-Burdock Project

<b>Table 8: Well Field Reclamation (cont.)</b>					
<b>Header Houses</b>		Included with building demolition/disposal in Table 9			
<b>Pipelines to be chipped and disposed as 11e.(2) byproduct material</b>					
<b>Trunklines from CPP or SF to well fields;</b>					
	No.	pipes	ft.	lb/ft	Chipped vol (CF)
<b>Burdock (CPP to WF)</b>					
1 16" HDPE per site	1	2	4000	24.2	3,600
2 10" HDPE per site	1	2	4000	10.93	1,600
<b>Dewey (SF to WF)</b>					
1 16" HDPE per site	1	2	1000	24.2	900
2 10" HDPE per site	1	2	1000	10.93	400
<b>Per HH (valve vaults to HH)</b>					
1 6" HDPE per HH	11	2	120	4.15	200
2 2" HDPE per HH	11	2	120	0.534	30
<b>Per Well (HH to well)</b>					
1 2" HDPE per PW, IMW	202	1	210	0.534	400
2 2" HDPE per PMW	70	1	720	0.534	500
3 1.5" HDPE per Inj. Well	411	1	210	0.342	600
Total to 11e.(2) byproduct material disposal - Table 6					8,230
<b>Pipeline chipping @ \$0.15/CF</b>					1,235
<b>Pipeline removal</b>		<b># pipes</b>	<b>ft of trench</b>	<b>\$/ft-pipe</b>	<b>Cost \$</b>
CPP-SF Trunklines		4	5,000	0.533	10,660
CPP-SF trunklines		4	19,800	0.533	42,214
Valve vaults to HH		3	1320	0.267	1,057
Well field pipelines		4	35,498	0.133	18,885
Cost of pipeline removal					72,816
<b>Total Well Field Decommissioning Costs</b>					<b>975,050</b>

Site Demolition  
Dewey-Burdock Project

<b>Table 9: Site Demolition</b>									
<b>Dewey-Burdock Project</b>									
Description	Units	No./Size	Quantity	Units	Unit Cost	Estimated Demo Cost	Vol. (CF) to Load on Trucks		
<b>Byproduct Materials</b>									
<b>Pond Demo and Send to 11e(2) Disposal Site</b>									
Accumulated solids - radium settling pond (@ 20 mg/L )							10,430	CF	
Load 30 CY roll-offs at site w/ front-end loader			386	cy	2	770			
<b>Deep Well Disposal Option</b>									
CPP pond (liner and leak detection system)									
80 mil HDPE primary liner @ 26 ft <sup>2</sup> /CF		1	123,281	sq ft	0.05	6,200	4,742		
Radium settling & spare ponds (liner and leak detection system)									
80 mil HDPE primary liner @ 26 ft <sup>2</sup> /CF		2	123,281	sq ft	0.05	12,300	4,742		
<b>Subtotal Materials to Demo and Send to Rad Waste Disposal Site:</b>						<b>18,500</b>	<b>9,500</b>	CF	
Load 30 CY roll-offs at site w/ front-end loader			352	cy	2	700			
<b>Subtotal pond disposal - DDW option</b>						<b>19,970</b>	19930	CF	
<b>Land Application Disposal option</b>									
CPP pond (liner and leak detection system)									
80 mil HDPE primary liner @ 26 ft <sup>2</sup> /cu.ft		1	189,231	sq ft	0.05	9,500	7,278		
Radium settling ponds (liner and leak detection system)									
80 mil HDPE primary liner @ 26 ft <sup>2</sup> /cu. ft.		2	205,959	sq ft	0.05	20,600	7,922		
<b>Subtotal Materials to Demo and Send to Rad Waste Disposal Site:</b>						<b>30,100</b>	<b>15,200</b>	CF	
Load 30 CY rollofs at site w/ front-end loader			563	cy	2	1,100			
<b>Subtotal pond disposal - land application option</b>						<b>31,970</b>	25630	CF	
<b>Equipment to be transported to 11e.(2) byproduct material disposal</b>							<b>CF</b>	<b>Semi-</b>	<b>loads</b>
Ion exchange columns, incl. resin: assume 12' dia. x 15'H	1,700	12	12	LS	1,000	12,000	20,400	6	
Vacuum dryers and appurtenances									
Dryers	1071	1	2	LS	10,000	20,000	1,071	2	
Vacuum pump/condensor skids, hot oil boiler skids, cooling tower system	480	1	2	LS	2,000	4,000	480	1	
<b>Subtotal removal/loading of (byproduct) equipment</b>						<b>36,000</b>	21951		<b>9</b>
<b>Equipment/Materials for transport to re-use or recycling facility</b>							<b>CF</b>	<b>Semi-</b>	<b>loads</b>
Pad or pole-mounted transformers (one per Header Hse) - 10 per truckload		11	1	LS	500	600			
Haul transformers to Rapid City (100 mi one-way)		1	200	mile	3.50	800			
Wire in OHE lines - 47,000' of OHE at Dewey; 54,000' at Burdock - 4 wires			404,000	lf	0	0			

Site Demolition  
Dewey-Burdock Project

Description	Units	No./Size	Quantity	Units	Unit Cost	Estimated Demo Cost	Vol. (CF) to Load on Trucks	
Valve vaults: cut off lid and dispose of lid	200	11	0.5	hrs	50	275		
Valve vaults: truck haul to recycler			200	mile	3.50	700		
Resin transfer truck and trailers (1 truck; 2 trailers)			1	LS	0	0		2
Chain-link fencing								
Around CPP site			2,240	lf	3.43	7,700		
Around Satellite site			1,440	lf	3.43	4,900		
Around CPP pond (380' sq)		440 ft. per side	1,760	lf	3.43	6,000		
Around radium settling ponds; CPP			9,700	lf	3.43	33,300		
Around radium settling ponds; Satellite			8,200	lf	3.43	28,100		
Barbed wire fencing in wellfields - 3 strand			87,000	lf	1.75	152,300		
Support steel in Drying area	4,500	1	1	LS	5,000	5,000	4,500	2
Standby generator	512	1	1	each	500	500	512	0.5
Diesel fuel tank - above ground, assume 15,000 gal	2,005	1	1	each	500	500	2,005	1
Gasoline fuel tank - above ground, assume 15,000 gal	2,005	1	1	each	500	500	2,005	1
Fire suppression pump system	512	1	1	LS	500	500	512	0.5
<b>Subtotal Demolition and Transportation/Disposal Equip/Mat'ls to be Sold or Recycled</b>						<b>242,000</b>	<b>9,500</b>	<b>7</b>
Equipment re-used/recycled						<b>242,000</b>		
<b>Equipment disposal specific to Wastewater Disposal method.</b>								
								<b>Semi-loads</b>
<b>DDW option</b>								
Equipment at DDW		1	4	LS	1,000	4,000		1
Pond outlet structures, pumps (DDW option)		1	4	LS	500	2,000		1
CPP pond (liner and leak detection system)								
60 mil HDPE secondary liner		1	123,281	sq ft	0.05	6,200	3,522	
Geonet		1	123,281	sq ft	0.05	6,200	3,522	
Single lined ponds (liner and leak detection system)								
40 mil single liner (outlet, surge)			280,946	sq. ft	0.05	14,000	8,027	
Uncontaminated 80 mil liner from unused spare ponds								
80 mil liner		2	123,281	sq ft	0.05	12,300	3,522	
Radium settling ponds (liner and leak detection system)								
60 mil HDPE secondary liner		2	123,281	sq ft	0.05	12,300	3,522	
Geonet (radium settling + spare ponds)		4	123,281	sq ft	0.05	24,700	3,522	
							25,639	2
Load 30 CY roll-offs at site w/ front-end loader			950	cy	2	1,900		
Subtotal DDW option						83,600		
								<b>Semi-loads</b>
<b>LA option</b>								
Land application center pivot machines	4,000	21	21	LS	1,000	21,000		5
Pond outlet structures, pumps (LA option)		1	5	LS	500	2,500		2

Site Demolition  
Dewey-Burdock Project

Description	Units	No./Size	Quantity	Units	Unit Cost	Estimated Demo Cost	Vol. (CF) to Load on Trucks	
Single lined ponds (liner and leak detection system)								
40 mil single liner (outlet, storage, spare storage)			2,457,374	sq. ft	0.05	122,900	70,211	
CPP pond (liner and leak detection system)								
60 mil HDPE secondary liner		1	189,231	sq ft	0.05	9,500	5,407	
Geonet		1	189,231	sq ft	0.05	9,500	5,407	
Uncontaminated 80 mil liner from unused spare ponds								
80 mil liner		2	205,959	sq ft	0.05	20,600	5,885	
Radium Settling Ponds (liner and leak detection system)								
60 mil HDPE secondary liner		2	205,959	sq ft	0.05	20,600	5,885	
Geonet (radium settling + spare ponds)		4	205,959	sq ft	0.05	41,200	5,885	
							98,678	7
Load 30 CY roll-offs at site w/ front-end loader			3,655	cy	2	7,300		
Subtotal LA option						255,100		
<b>Equipment/Materials to Demo and Dispose at Construction and Demolition Landfill</b>								
Process pumps in buildings	16	60	60	LS	200	12,000	960	1
Shaker screens: 10'x7'x5'H	400	2	2	LS	2,000	4,000	800	1
Elution columns: 7' dia x 15'H	600	4	4	LS	1,000	4,000	2,400	2
13' dia. tanks x 16'H	2,100	22	22	LS	500	11,000	46,200	11
11' dia. tanks x 16'H	1,500	2	2	LS	1,000	2,000	3,000	1
10' dia. tanks x 16'H	1,300	1	1	LS	1,000	1,000	1,300	1
RO units	400	4	4	LS	1,000	4,000	1,600	1
Thickeners	10,600	2	2	LS	10,000	20,000	21,200	5
Screw conveyors	100	2	2	LS	1,000	2,000	200	6
Filter presses	2000	2	2	LS	5,000	10,000	4,000	1
Chemical storage tanks outside CPP - assume 20,000 gal	2674	3	3	LS	500	1,500	8,021	3
Drum conveying system	2,900	1	1	LS	1,000	1,000	2,900	0.5
Drum washer and drying system	1,200	1	1	LS	1,000	1,000	1,200	0.5
Paint booth	400	1	1	LS	500	500	400	0
<b>Building Structures</b>								
Office building	60x90x20+roof		148,500	CF	0.15	22,300	18,600	
Maintenance/Warehouse	140x120x20		462,000	CF	0.15	69,300	33,800	
Fire suppression tank	240,000 gal		30,968	CF	0.15	4,600		
<b>Building Structure</b>								
CPP, includes loading dock area	392'x130'x20'+roof		1,486,840	CF	0.15	223,000	77,560	
Lab/control rm/break rm/showers/restrooms w/in CPP	30x90x20'		54,000	CF	0.15	8,100	10,200	
Rad container bldg	30x24x15		10,800	CF	0.15	1,600	2,340	
Header houses - assume equip/piping inside demo'd w/ bldg	10x40x8	11	3,200	CF	0.15	5,280	8,800	
Satellite bldg, incl interior wall	124x156x20		396,552	CF	0.15	59,500	39,448	
Lab/control rm/break rm/showers/restrooms w/in Satellite	45x45x20		40,500	CF	0.15	6,100	4,950	
				<b>Subtotal Bldgs Demo:</b>		<b>399,780</b>	<b>342,600</b>	34

Site Demolition  
Dewey-Burdock Project

Description	Units	No./Size	Quantity	Units	Unit Cost	Estimated Demo Cost	Vol. (CF) to Load on Trucks
<b>Transportation/Disposal</b>							
Loading 30 CY rolloffs at site w/ front-end loader			12,689	CY	2	25,400	
Loading process equipment			34	semi load	1,000	34,000	
Transportation to Regional landfill at Edgemont, SD @ 16 miles	\$3.50/mi x 16 mi + \$1.98/mi x 1		423	semi-load	88	37,100	
Transportation to RE-use/Recycling sit @ Rapid City, SD @ 87 miles	\$3.50/mi x 87 mi + \$1.98/mi x 8		7	semi load	477	3,300	
Disposal fee at Custer -Fall River landfill, Edgemont, SD			12,689	CY	10	126,900	
			<b>Subtotal Transportation/Disposal - Subtitle D Material:</b>			<b>226,700</b>	
			Transportation/Disposal in Landfill			<b>626,000</b>	
<b>Other Misc Demo Activities</b>							
Rinse piping and treat rinsewater - assume 3 piping volumes	2,263,486 gal/pipe vol		6,790	1,000 gal	3	20,400	
Valve vaults at well fields - leave in place fill with soil		11	11	CY	20	2,500	
Septic tank - CPP: 15,000 gal (fill with soil, leave in place)	15,000 gal	1	2,005	CY	10	20,100	
Septic tank - Satellite: 10,000 gal (fill with soil, leave in place)	10,000 gal	1	1,337	CY	10	13,400	
Backfill excavation and compact surge pond (Dewey)			59,259	CY	1	59,300	
Backfill excavation and compact radium settling ponds volume (Dewey)			185,185	CY	1	185,200	
Abandon DDWs			0	wells	100,000	0	
Reseed well field areas (fertilize, seeding, mulching)			67	acre	1,500	100,700	
Reseed CPP site			11	acre	1,500	16,600	
Reseed CPP radium settling ponds			48	acre	1,500	71,300	
Reseed Satellite plant area			35	acre	1,500	52,300	
Reseed access road to CPP			11	acre	1,500	16,500	
Reseed access road to Satellite			8	acre	1,500	12,000	
			<b>Subtotal Other Misc Demo Activities:</b>			<b>570,300</b>	
<b>LA Option only</b>							
Backfill excavation and compact storage ponds	8 x 63.8 ac ft		823,000	CY	1	823,000	
Reseed storage pond area			24	acre	1,500	35,800	
			<b>Subtotal addl other Misc for LA option</b>			<b>858,800</b>	
<b>Summary of Facility Decommissioning Costs</b>			<b>DDW</b>	<b>LA</b>			
A	Recyclable/salvageable equipment		242,000		242,000		
B	Non-salvageable buildings & equipment disposal		710,080		1,123,580		
C	11e.(2) byproduct material processing/loading		55,970		67,970		
D	Restore contaminated areas		570,300		1,429,100		

Survey  
Dewey-Burdock Project

<b>Table 10: Survey Dewey-Burdock Project</b>	Disposal Option	
	DDW	LA
<b>Gamma Survey Area (acre)</b>		
Disturbed area after first year of production		
Well fields		
Burdock WF1	17.6	17.6
Dewey WF1	39.3	39.3
Site areas: CPP, SF, pipelines between CPP-		
SF, site access roads	23.8	23.8
Major pipelines (est. 30% of 24.79 ac total)	7.4	7.4
WF access roads (est. 30% of 140 acres total)	6.2	6.2
DDWs (assume 0.1 acre per DDW)	0.2	0
Irrigation area		1,052
Impoundments, topsoils	33	136
<b>Total survey area (acre)</b>	<b>128</b>	<b>1,282</b>
<b>Gamma Survey Costs</b>		
Mob/Demob	4,000	4,000
100-m transects (\$/acre)	10	12
Survey cost	1,280	15,384
Survey report	5,000	5,000
Survey Total \$	10,300	24,400
<b>Total Survey Cost</b>	<b>10,300</b>	<b>24,400</b>

Labor  
Dewey-Burdock Project

Table 11: Labor				Project Year						
				1	2	3	4	5	6	
Activity				Constrctn	Prodctn	Restoration+ stability	Recl. + Decomm.			
Administration										
	Radiation Safety Officer					1	1	1	1	
Restoration										
	Superintendent					1	1	1		
	Restoration Engineer					1	1	0	0	
	Restoration Operator					2	0	0	0	
	Lab Technicians					1	1	0	0	
Unit Labor Costs including 35% overhead										
Administration										
	Radiation Safety Officer			135,000			135,000	135,000	135,000	
Restoration										
	Superintendent			135,000			135,000	135,000	0	
	Restoration Engineer			81,000			81,000	81,000	0	
	Restoration Operator			68,000			136,000	0	0	
	Lab Technicians			47,000			47,000	47,000	0	
Project Year					1	2	3	4	5	6
Restoration and Reclamation Labor Cost							534,000	398,000	270,000	135,000

Management  
Dewey-Burdock Project

<b>Table 12: Management and Miscellaneous Costs Dewey-Burdock Project</b>					
	Project year				Total
	3	4	5	6	
<b>Mob/Demob</b>	12,500			12,500	25,000
Total Management Facility Manager @ \$150,000 + 35%	202,500	202,500	202,500	202,500	810,000
<b>Contractor Profit</b> Percent of labor 10%	53,400	39,800	27,000	13,500	133,700
Subtotals Mgmt & Misc. - \$	268,400	242,300	229,500	228,500	968,700

Impoundments  
Dewey-Burdock Project

Table 13: Impoundments											
Dewey-Burdock Project											
PONDS	# ponds	DDW					LA				
		capacity ac-ft	liner/pond ft <sup>2</sup> *	Primary mil	Secondary mil	capacity ac-ft	Liner ft <sup>2</sup> *	Primary mil	Secondary mil		
CPP	1	15.9	123,281	80	60	36.2	189,231	80	60		
Radium Settling	2	15.9	123,281	80	60	39.4	205,959	80	60		
Spare	2	15.9	123,281	80	60	39.4	205,959	80	60		
Outlet	2	5.1	53,068	40		4.9	18,588	40			
Surge	2	8.4	87,405	40							
Storage	8					63.8	242,020	40			
Spare Storage	2					63.8	242,020	40			
Totals	Liner ft <sup>2</sup> (KP)-Dewey		264,718	80			433,190	80			
	Liner ft <sup>2</sup> (KP)-Dewey		264,718	60			433,190	60			
	Liner ft <sup>2</sup> (KP)-Dewey		140,473	40			1,228,687	40			
	Liner ft <sup>2</sup> (KP)-Burdock		351,689	80			579,875	80			
	Liner ft <sup>2</sup> (KP)-Burdock		351,689	60			579,875	60			
	Liner ft <sup>2</sup> (KP)-Burdock		140,473	40			1,228,687	40			
	Total 80 mil (KP)		616,407	80			1,013,065	80			
	Total 60 mil (KP)		616,407	60			1,013,065	60			
	Total 40 mil (KP)		280,946	40			2,457,374	40			
KP= Total liner areas, as reported by Knight Piesold (KP) in Pond Design Report											
* Liner area of individual ponds estimated as proportional to pond capacity											

Well Field Pipe Removal  
Dewey-Burdock Project

**Table 14: Well Field Pipe Removal  
Dewey-Burdock Project**

Assumptions

- 1 Backhoe trench to uncover pipe @ 1,500 ft/day
- 2 Extract pipeline and backfill @ 1,500 ft/day
- 3 Backhoe rental \$2688/mo., plus fuel, maint., mob. @ \$1,200/wk) = \$1,840/wk
- 4 Backhoe operator @ \$20/hr
- 5 Pipeline extraction with 2 workers @ \$17/hr in addition to backhoe operator
- 6 Operating schedule: 8 hr/day, 5 days/week

Main pipeline removal

Equipment

$$\frac{\$ 1840}{\text{week}} \times \frac{1 \text{ week}}{5 \text{ days}} \times \frac{1 \text{ day}}{1,500 \text{ ft}} = \$ 0.245333 \text{ /ft}$$

Labor

Backhoe operator

$$\frac{\$ 20}{\text{man-hr}} \times \frac{8 \text{ man-hr}}{1 \text{ day}} \times \frac{1 \text{ d}}{1,500 \text{ ft}} = \$ 0.11 \text{ /ft}$$

Pipeline extraction

$$\frac{\$ 17}{\text{man-hr}} \times \frac{16 \text{ man-hr}}{1 \text{ day}} \times \frac{1 \text{ day}}{1,500 \text{ ft}} = \$ 0.18 \text{ /ft}$$

<b>Pipelines extraction cost per foot</b>	<b>= \$ 0.533</b>
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